

**CLAIMS**

We claim:

- 1           1.       An ultrasonic imaging system capable of producing C-Mode images and/or  
2           collecting 3D image data of a target, said system comprising:  
3                 a housing;  
4                 a transducer array disposed on said housing;  
5                 a display unit disposed on said housing, wherein said transducer and said  
6           display unit is integrated with the housing; and  
7                 a beamformer in communication with said system;
- 1           2.       The system of claim 1, wherein said beamformer is disposed on said housing.
- 1           3.       The system of claim 2, wherein said display unit lies in a plane substantially  
2           parallel or exactly parallel to said transducer array.
- 1           4.       The system of claim 2, wherein said display unit is adjustably mounted to said  
2           housing.
- 1           5.       The system of claim 4, wherein adjustment of the angle of said display unit  
2           controls the slice of a 3D image set to be displayed.
- 1           6.       The system of claim 2, wherein said system weighs less than about 5 pounds.
- 1           7.       The system of claim 2, wherein said system weighs less than about 2 pounds.
- 1           8.       The system of claim 2, wherein said housing has a volume of less than about 4  
2           cubic inches.
- 1           9.       The system of claim 2, wherein said housing has a volume of less than about  
2           48 cubic inches.
- 1           10.      The system of claim 1, wherein said display unit lies in a plane substantially  
2           parallel or exactly parallel to said transducer array.

1           11.     The system of claim 1, wherein said display unit is adjustably mounted to said  
2     housing.

1           12.     The system of claim 11, wherein adjustment of the angle of said display unit  
2     controls the slice of a 3D image set to be displayed.

1           13.     The system of claim 1, wherein said display unit is adapted for displaying an  
2     image, said image displayed on said display unit is scaled in a manner whereby dimensions of  
3     said image corresponds with dimensions of the target.

1           14.     The system of claim 1, wherein said display unit is adapted for displaying an  
2     image, said image displayed on said display unit is scaled in a manner that magnifies the  
3     dimensions of the target.

1           15.     The system of claim 14, wherein said system further comprises a user control  
2     unit, wherein said image displayed on said display unit is scalable as determined by a user.

1           16.     The system of claim 1, wherein said display unit is adapted for displaying an  
2     image, said image displayed on said display unit is a representation of a complete 3D image.

1           17.     The system of claim 1, wherein said display unit is adapted for displaying an  
2     image, said image displayed on said display unit is a single slice through a complete 3D  
3     image.

1           18.     The system of claim 1, wherein said display unit is adapted for displaying an  
2     image, said image displayed on said display unit is a C-Mode image of the tissue, whereby  
3     said displayed image is obtained in a plane substantially parallel or exactly parallel to the face  
4     of the transducer.

1           19.     The system of claim 18, wherein said image displayed on said display unit  
2     displays an animation whereby said C-Modes images are from different depths of the target,  
3     said animation may be displayed simultaneously or a different times.

1           20.     The system of claim 1, wherein said display unit is adapted for displaying an  
2 image, said image displayed is formed by averaging at least two envelope detected images  
3 from multiple parallel planes, whereby appearance of speckle in the displayed image is  
4 reduced.

1           21.     The system of claim 1, wherein said display unit is adapted for displaying an  
2 image, said image displayed represents estimated blood flow velocities encoded in color.

1           22.     The system of claim 1, wherein said display unit is adapted for displaying an  
2 image, said image displayed depicts Power Doppler information.

1           23.     The system of claim 1, wherein said display unit is adapted for displaying an  
2 image, said image displayed depicts tissue harmonic information.

1           24.     The system of claim 1, wherein said display unit is adapted for displaying an  
2 image, said image displayed is formed by transmit-receiving compounding.

1           25.     The system of claim 1, wherein said display unit is adapted for displaying an  
2 image, said image displayed is formed by receive only spatial compounding.

1           26.     The system of claim 1, wherein said display unit is adapted for displaying an  
2 image, said image displayed is formed by frequency compounding.

1           27.     The system of claim 1, wherein said display unit is adapted for displaying an  
2 image, said image displayed depicts speckle pattern decorrelation over time as a means to  
3 identify tissue or blood motion.

1           28.     The system of claim 1, wherein said transducer array transmits ultrasonic  
2 energy into the target, wherein the ultrasonic energy transmitted uses one or more focused  
3 transmit beams.

1           29.     The system of claim 1, wherein said transducer array transmits ultrasonic  
2     energy into the target, wherein the ultrasonic energy transmitted uses an unfocused transmit  
3     beam.

1           30.     The system of claim 1, wherein said transducer array transmits ultrasonic  
2     energy into the target, and said transducer array being responsive for receiving ultrasonic  
3     echo signals from the target, said transducer array using a coded excitation scheme to  
4     increase the effective signal to noise ratio of received echo signals.

1           31.     The system of claim 1, further comprising:  
2             at least one passage in communication with said system, said system being adapted to  
3     correlate location of said passage with the target.

1           32.     The system of claim 31, wherein a needle or tool can be inserted into said  
2     passage, and said location of said needle or tool is tracked and displayed on said display unit  
3     relative to said passage.

1           33.     The system of claim 31, wherein at least of one said passage is disposed on at  
2     least one of said transducer array and/or housing.

1           34.     The system of claim 1, further comprising:  
2             a marker unit, said marker unit adapted for placing one or more marks on the target.

1           35.     The system of claim 1, wherein said transducer array is comprised at least in  
2     part of lead zirconate titanate or some other appropriate piezoelectric material.

1           36.     The system of claim 1, wherein said system weighs less than about 5 pounds.

1           37.     The system of claim 1, wherein said system weighs less than about 2 pounds.

1           38.     The system of claim 1, wherein said housing has a volume of less than about 4  
2     cubic inches.

1           39.    The system of claim 1, wherein said housing has a volume of less than about  
2   48 cubic inches.

1           40.    The system of claim 1, further comprising:  
2           at least one removable cover, at least one said cover at least partially covering said  
3   housing.

1           41.    The system of claim 40, further comprising:  
2           at least one adhesive device, at least one said adhesive device at least partially  
3   disposed on said cover.

1           42.    The system of claim 40, further comprising:  
2           at least one intake disposed on said cover, said intake allowing access through said  
3   cover.

1           43.    The system of claim 1, further comprising:  
2           at least one adhesive device, at least one said adhesive device at least partially  
3   covering said housing.

1           44.    The system of claim 1, further comprising:  
2           at least one retaining device, at least one said retaining device at least partially  
3   disposed on said housing.

1           45.    The system of claim 1, wherein at least one of said housing, display, and  
2   transducer array is curved.

1           46.    A method of imaging a target to produce C-Mode ultrasonic images and/or  
2   collecting ultrasonic 3D image data, comprising the steps of:  
3           providing a housing;  
4           providing a transducer array disposed on said housing, said transducer for  
5   transmitting ultrasonic energy into the target and receiving ultrasonic echo signals  
6   from the target;  
7           beamforming said received echo signals to provide data;

8                    processing said beamformed data; and  
9                    providing a display unit disposed on said housing, said display unit displaying  
10                   said processed data.

1            47.     The method of claim 46, wherein said beamformer is disposed on said  
2            housing.

1            48.     The system of claim 31, wherein the location correlation function is achieved  
2            by at least one intersection point indicator displayed on said display unit, at least one said  
3            intersection point indicator corresponds with at least one desired intersection point on the  
4            target and/or at least one image plane of the target.

1